

ON A DIBRANCHIATE CEPHALOPOD (*Plesioteuthis*) FROM  
THE LITHOGRAPHIC STONE (LOWER KIMMERIDGIAN) OF  
EICHSTÄDT, BAVARIA.

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PLATE IX.

ALTHOUGH the genus *Plesioteuthis*, instituted by Dr. A. Wagner (6, p. 785) in 1860, is perhaps the best-known dibranchiate Cephalopod (see Zittel, 7, p. 519) from the Lithographic Stone of Bavaria, particularly the species *P. prisca*, an example of this genus in the British Museum collection from Eichstädt, Bavaria, is so excellently preserved, and displays certain characters which have not been previously recorded in any described example of the genus, that it seems to merit description. It is the subject of the present note.

The fossil is displayed on the surface of a slab and exhibits a dorsal aspect of the specimen. It is almost symmetrically arranged and exhibits the body with its fins, the head, and the arms. A stellate mass of calcite in the head appears to represent the cavity of the buccal mass.

The *Body* is elongated, broadest at about two-fifths of its length from the anterior margin (*e*), which is indicated by a narrow shallow transverse groove, rather more than one-fourth of its length. At the anterior margin the body appears to have been about 65 mm. wide; thence it tapers very gradually to about 56 mm. at a distance of about 60 mm. from the anterior margin; it then expands rather rapidly, attaining its greatest width of 74 mm. at about 110 mm. from the anterior margin; from the point of its greatest width it tapers evenly towards the posterior end for about another 95 mm. After gradually expanding for about 20 mm. it again tapers evenly to the end of the body. Here there are four obscure, almost symmetrically disposed spinous processes which seem to have belonged to the animal. Two are at the extreme end of the animal, their bases 8 mm. apart, feebly inclined outwards, and roughly about 13 mm. long. The others are situated at the posterior end of the line of junction of each fin with the body, and are also of about the same length (13 mm.). The writer has not seen similar processes in any of the other examples of this genus in the British Museum Collection. Judging from the impression of a portion of the mantle displayed on each side of the body, the surface of the mantle appears to have been finely granular. So far as the present writer is aware, the presence of *fins* in this genus has not yet been recorded. The specimen under consideration exhibits them very clearly. They

are separate and quite at the posterior end of the body. As preserved in this specimen they are not of the same length. Each is wing-shaped and transversely elongate, and though fairly well-, is not sharply-defined. That on the right (*g*) is about 83 mm. long, and 25 mm. broad at its widest part; its line of attachment is about the same as the width of the fin, the distal end obtusely pointed and slightly recurved; the proximal half of the anterior border is feebly concave and the distal half slightly convex, whilst of the posterior border the middle portion is feebly convex, the proximal and distal thirds faintly concave; the fin on the left side (*h*) is rather larger than that on the right, its anterior and posterior margins are nearly parallel, it is about 120 mm. long and 30 mm. wide, and its distal end is obtusely pointed and recurved. The dorsal part of the *mantle-margin* (*e*), which alone can be seen, is on the whole feebly convex, with a faint concavity on each side of the median third. In this (the dorsal) aspect of the animal the *siphon* (being on the ventral side) is naturally not shown, and it may be fortunately for the rest of the fossil, there are no traces of the ink-bag and no discoloration due to the spilt ink.

The *Head* appears to have been narrower than the body, probably only about 40 mm. wide; a smooth oval-shaped area (*i*), 19 mm.  $\times$  11 mm., immediately beneath the base of the arms, on the left of the median line, with its major axis placed longitudinally and slightly inclined towards the median line, probably indicates the position of the left eye; whilst a similarly-situated lenticular impression (*j*), 18 mm.  $\times$  8 mm., on the right of the median line, apparently indicates the position of the right eye.

The *Arms*, eight in number, are disposed almost symmetrically with respect to the body. That there are four pairs is quite clear, but they are all so much flattened that their sequence is somewhat obscure. There does not seem to be much doubt that the irregular stellate mass, partially filled with calcite, indicates the position of the buccal mass (*k*), the somewhat irregular projections from it being the remains of the points of the buccal membrane. A thickened V-shaped mass, having its obtuse point directed backwards, and at about 30 mm. in front of the centre of the buccal mass, evidently represents two thick arms (*al*, *ar*) with their bases attached. Each is about 11 mm. wide, and, tapering rather rapidly, appears to have been about 55 mm. long. A very indistinct forwardly-concave curve (*l*), at about 33 mm. from the extreme base of the united arms, may indicate the margin of a web joining the two arms. Compared with the other arms these appear to have been relatively short and stout. Since they appear to be overlaid by the other arms, and remembering that the dorsal surface of the animal is uppermost, it seems safe to assume that they were the ventral pair. Near the buccal mass is a smooth area from which arise two smooth areas, each approximately 15 mm. wide; these pass over the short, stout arms with their inner margins about 17 mm. apart; they slowly diverge at an angle of about  $18^\circ$  until at about 65 mm. from the buccal mass, from which point they gradually converge, when they meet and are superposed. Each can be traced for a length of about 150 mm. from the buccal

mass, but their distal ends are not definitely indicated. Each of these flattened areas bears two distinct bands of a reddish-brown colour, averaging about 1 mm. wide, their edges being usually more distinct than the rest of the band, the inner of the two bands being the larger on each side; that (the longer one) on the right can be traced for about 100 mm. from the centre of the buccal mass. It would seem, therefore, that each of these elongated flattened areas represents two arms, that ( $d^l$ ,  $d^r$ ) nearer the median line being the longer of the two, and extending from the buccal mass to the point of superposition with its fellow. Further, the longer arm ( $d^l$ ,  $d^r$ ) appears to rest upon the shorter ( $c^l$ ,  $c^r$ ), since, on the right side, the shorter band of colour ends abruptly at a very slightly elevated ridge formed by the outer edge of the longer arm, whilst on the other side the colour band of the corresponding arm disappears before the band on the larger arm. Outside these arms, on a level with the buccal mass and about 26 mm. apart, arise two arms ( $b^l$ ,  $b^r$ ), each about 4 mm. wide, diverging at about an angle of  $40^\circ$ , that extend in an almost straight line for about 30 mm., and then curve gently outwards, extending for about another 30 mm. These appear to have been more cylindrical than the arms marked  $b$  and  $c$ , and their surface appears to have been rougher. Further, connecting these and the arms marked  $c$ , there appears to have been a membrane, the outward margins of which seem to be indicated on each side of the animal by an obscure forwardly-concave curve at about 54 mm. in advance of the centre of the buccal mass. Anterior to this curved line the surface of the stone is somewhat rougher, indicating that the membrane (if such there was) was comparatively smooth. The order of these appendages seems to have been (commencing on the ventral side)  $a$ ,  $b$ ,  $c$ ,  $d$ , and if none of these represent the tentacles in living Cephalopods, then the order of the arms (counting from the ventral side) would be  $a$ ,  $b$ ,  $c$ ,  $d=1, 2, 3, 4$  respectively. There are no traces of hooklets on or about any of the arms, a fact which was mentioned by Zittel (7, p. 519); nor are there any structures which can be definitely recognized as suckers, though each probably did exist.

Within the two thickened arms there is on the right side a thickening ( $m$ ) about 7 mm. wide, which, passing under the stout arm on the right side, curves over to the right, and can be traced for a further distance of about 27 mm., when it abruptly ends. There is a similarly placed but more obscure thickening on the left side. Whether these represent the *tentacles* or whether, in fact, they had anything to do with the animal, is quite uncertain.

Diffused over the head, the anterior portion, and the posterior part of the body there is a reddish-brown hue, similar to the bands of colour on some of the arms, that, it is suggested, may have been derived from the colour of the animal. There is a similar colour, more intensified, however, on the matrix immediately adjacent to each side of the animal, that may have had the same derivation.

The form of the *gladius* (or pen) is well shown, chiefly as the impression of its ventral surface, only a few fragments of the actual

gladius being preserved at its anterior end, at about its mid-length, and at its posterior end respectively. As a whole the gladius is acutely-triangular, the apical angle being about  $11^\circ$ , and the base, which is anterior, about 53 mm. It is traversed by very fine somewhat irregularly-placed longitudinal striæ. There is a well-marked median area, which at the anterior end of the pen attains a width of about 14 mm., and a lateral area on each side. Each lateral portion bears a slightly-thickened area which extends longitudinally, and terminates anteriorly in a rounded process (*n*) about 9 mm. wide, and of a brownish colour. Between these two processes the anterior boundary of the gladius is obscure; it may have been projected forward for about 12 mm., so as to form a broad, fully-convex projection, about 21 mm. broad, since the surface of this projection seems to be continuous with that of the pen. Posteriorly, at about 55 mm. from the end of the lateral process, the pen expands rather suddenly, though slightly, but soon resumes its original direction, and at about its mid-length it again gradually expands through about a fourth of its length, then gradually contracting it attains, at about 55 mm. from the posterior end, a width of about 25 mm. The rest of the pen has a rhomboidal form, its greatest width, corresponding to the shorter axis of the rhomboid, being about 43 mm., the lateral angles of the rhomboid occupying the median line of each fin, for which undoubtedly this portion of the pen formed a support.

*Dimensions.*—Assuming that the stellate mass (*k*) of calcite in the head represents the cavity of the buccal mass, and that the posterior end of the body (excluding some spinous processes) is about 332 mm. from this point, the dimensions of the specimen, so far as ascertainable, are as follows:—

	mm.
From posterior end of body to mantle-margin . . . . .	290
From posterior end of body to anterior end of lateral process of pen . . . . .	278
Breadth of body (at anterior end) . . . . .	55
Breadth of body at widest part, which is at about 105 mm. from the anterior end . . . . .	75
Width of pen at anterior end of lateral process . . . . .	52
Width of pen at about 70 mm. posterior to the anterior end of lateral processes . . . . .	53
Width of head probably about . . . . .	40
From anterior end of pen to centre of buccal mass . . . . .	42
From the centre of the buccal mass the arms can be certainly traced for a length of . . . . .	58

The whole length of the animal with its arms must have been 490 mm. (about 1 ft.  $7\frac{1}{2}$  in.).

When Dr. A. Wagner (6, p. 784) founded the genus *Plesiotheuthis*, he recognized two species, viz. *Plesiotheuthis prisca* and *P. acuta*.

*Plesiotheuthis prisca* was originally described by Rüppell (5, p. 8, pl. iii, fig. 1) as a *Loligo* in 1829, and quite a number of forms which were subsequently described by Münster and by D'Orbigny were

regarded by Wagner as referable to the same species.<sup>1</sup> The type came from the Deutingen Quarry, near Mohnheim.

The other species, *Plesioteuthis acuta* (3, p. 64, pl. vii, figs. 4, 5) was originally described by Münster as an *Acanthoteuthis*.

In the original description, in 1829, of the species *P. prisca*, Rüppell (5, p. 9) referred to the presence on the dorsal side of a heart-shaped swimming membrane, about one-fifth of the length of the whole mantle, and, from his figure, it would seem that he was alluding to the expansion at the posterior end of the body, surrounding the lance-shaped posterior extremity of the gladius to which he also refers. It would appear that this expansion of the gladius was fairly flexible, because in several examples in the British Museum collection that exhibit a lateral aspect of the animal the posterior part of the pen is evidently folded upon itself along the median line.

The lance-shaped extremity of the gladius was figured by Münster (3) in several Teuthids from the Lithographic Stone of Bavaria (pl. iv, figs. 6, 7; pl. v, figs. 1-5; and pl. vi, fig. 3); but none of these were named. Of these the one most nearly resembling the present specimen is the original of pl. v, fig. 3. So far as the present writer is aware, the presence in this genus of terminal fins has not yet been recorded.

The genus *Acanthoteuthis* was instituted by R. Wagner (in Münster, 1, pp. 92-4) in 1839, and subsequently Münster (3, pp. 56-9) recognized three subdivisions of the genus, viz. (1) *Acanthoteuthis*, sens. str., (2) *Doryanthes*, and (3) *Acanthopus*. The figures above mentioned would all belong to his section *Doryanthes* (p. 58), but there seems to be no allusion to them in the text, and they are not named in the explanation of the plates. This is to be regretted, since one example (pl. v, fig. 3) exhibits, at the anterior end, structures to which one would like to have seen some reference. One of these—the posterior—is very similar to the structure of the anterior end of the median portion of the gladius in the present specimen. It is, however, to be noted that Münster's figure, judging from the presence of the ink-bag, represents the ventral surface of the gladius, from which structure it is quite distinct, although the anterior boundary of the gladius is not very clearly shown.

Although the present example exhibits features which have not hitherto been observed in the genus *Plesioteuthis*, it is not proposed to establish a new genus for it, nor even to regard it as a new species, but to consider the specimen as an example of *Plesioteuthis prisca* in a better state of preservation than any specimen previously described.

<sup>1</sup> The synonyms mentioned by Wagner (6, p. 816) were as follows:—

“*Acanthoteuthis angusta, brevis, intermedia, lata* (partim), *rhomboidalis, sagittata, semistriata, subconica, subovata, and tricarinata*, Münt.  
*Loligo prisca*, Rüpp.; *L. subsagittata*, Münt.; *Enoplateuthis subhastata*, d'Orb.

*Omnastrephes angustus, sagittatus, intermedius, and cochlearis*, d'Orb.”  
To these may be added the *Leptoteuthis gracilis* of Owen (4, p. 3), from the Lithographic Stone of Solenhofen, near Pappenheim, Germany, which the present writer had an opportunity of examining in 1887.



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## EXPLANATION OF PLATE IX.

## PLESIOTEUTHIS PRISCA, Rüppell, sp.

- a<sup>r</sup>, b<sup>r</sup>, c<sup>r</sup>, d<sup>r</sup>*. 1st, 2nd, 3rd, and 4th arms of the right side.  
*a<sup>l</sup>, b<sup>l</sup>, c<sup>l</sup>, d<sup>l</sup>*. 1st, 2nd, 3rd, and 4th arms of the left side.  
*e*. mantle-margin.  
*f*. spinous processes at posterior end of body.  
*g*. right terminal fin.  
*h*. left terminal fin.  
*i*. position of left eye.  
*j*. position of right eye.  
*k*. cavity indicating position of buccal mass.  
*l*. probable margin of web connecting arms.  
*m*. obscure thickening of uncertain character.  
*n, n*. anterior terminations of lateral portions of gladius.

Lithographic Stone (Lower Kimmeridgian): Eichstädt, Bavaria. One-third of the natural size. Original in the Geological Department of the British Museum (Natural History), London. [Register number C. 15118.]